CLAIMS

1. A vertical take-off and landing aircraft comprising:

(a) a main body adapted for flight while oriented substantially in a horizontal plane;

(b) at least one air impeller engine mounted in said main body oriented substantially along a vertical axis normal to the horizontal plane having an impeller rotor mounted within an air channel duct or shroud formed in said main body of said aircraft, said impeller rotor being formed with impeller blades with inner ends fixed to a central hub and outer ends fixed to an annular impeller disk rotatable about a rotational axis aligned with the vertical axis to propel a downward flow of air to provide vertical lift to the aircraft, and a magnetic bearing system for suspending the impeller rotor substantially friction-free within the air channel duct or shroud; and

(c) a magnetic induction drive formed by one array of magnetic induction elements arranged circumferentially on the annular impeller disk of said impeller rotor and another array of magnetic induction elements arranged on a wall of said air channel duct or shroud facing opposite the array on the annular impeller disk across a small air gap therebetween for driving the impeller disk in rotation by magnetic induction.

2. A vertical take-off and landing aircraft according to Claim 1, further comprising an air directing assembly for directing at least a part of the thrust flow of air from the air impeller engine in a desired angular direction with respect to the horizontal plane to generate a horizontal thrust component for maneuvering or translation movement of the aircraft.

3. A vertical take-off and landing aircraft according to Claim 2, wherein said air directing assembly is an air vane assembly mounted below said air impeller engine having a pair of rotatable vanes, one rotatable on an X axis and one rotatable on a Y axis perpendicular to each other in the horizontal plane, and vane actuator means for rotating each vane at a selected deflection angle on its axis for directing the thrust flow of air in a desired angular direction.

4. A vertical take-off and landing aircraft according to Claim 2, wherein said air

directing assembly is an air vane assembly mounted below said air impeller engine having one or more rotatable vanes in a parallel array mounted to a rotatable support ring, a first actuator means for rotating the vanes at a selected deflection angle on an axis in the horizontal plane, and a second actuator means for rotating the support ring on the vertical axis, for directing the thrust flow of air in a desired angular direction.

5. A vertical take-off and landing aircraft according to Claim 2, wherein said air directing assembly is an engine swivel assembly for mounting said air impeller engine in a tiltable manner, having an inner swivel ring fixed to said air impeller engine, a first swivel ring mounting a first pair of swivel actuators on diametrically opposite sides thereof which are coupled to diametrically opposite sides of said inner swivel ring for tilting said inner swivel ring with said air impeller engine on a first axis in an X-Z plane, and a second swivel ring mounting a second pair of swivel actuators on diametrically opposite sides thereof which are coupled to diametrically opposite sides of said first swivel ring for tilting said first swivel ring on a second axis in a Y-Z plane perpendicular to the first axis, for directing the thrust flow of air in a desired angular direction.

6. A vertical take-off and landing aircraft according to Claim 1, wherein said annular impeller disk is formed as a hollow annular channel containing pitch change mounting means therein coupled to the outer ends of the rotor blades for varying the pitch of the rotor blades.

7. A vertical take-off and landing aircraft according to Claim 6, wherein said hollow annular channel of said annular impeller disk contains for each blade a stepper motor drive for rotating the end of the blade, control means for receiving a blade pitch control signal and providing it to the stepper motor drive, and a power source for supplying power to the stepper motor drive for rotating the end of the blade, said components being distributed circumferentially around the hollow annular channel at respective positions of the blade ends for a even distribution of mass.

8. A vertical take-off and landing aircraft according to Claim 1, wherein said air impeller engine is provided with dual coaxial, contra-rotating rotors arranged one on top of the other for gyroscopic stability.

9. A vertical take-off and landing aircraft according to Claim 1, having a single air impeller engine arranged on a central vertical axis of the vehicle.

10. A vertical take-off and landing aircraft according to Claim 1, having two air impeller engines arranged at opposite ends of the main body formed with a longitudinal fuselage chassis and balanced about its center of gravity.

11. A vertical take-off and landing aircraft according to Claim 1, having three engines positioned in a triangular arrangement on the main body balanced about its center of gravity.

12. A vertical take-off and landing aircraft according to Claim 11, wherein one engine is positioned at a forward apex of the triangle oriented in a forward flight direction and the other two engines are spaced apart and carried on an overhead wing mounted on the main body.

13. A vertical take-off and landing aircraft according to Claim 1, having multiple engines positioned in a symmetrical arrangement on the main body and balanced about its center of gravity.

14. A vertical take-off and landing aircraft according to Claim 1, wherein said main body is formed with a longitudinal fuselage chassis oriented in a forward flight direction and a pair of winglets arranged on respective sides of the longitudinal fuselage chassis for controlling flight stability.

15. A vertical take-off and landing aircraft according to Claim 1, having air rudders or flaps provided on said main body for controlling flight stability.

16. A vertical take-off and landing aircraft according to Claim 1, wherein said main body is formed with a longitudinal fuselage chassis oriented in a forward flight direction and

an overhead wing mounted on said main body for providing lift and controlling flight stability.

17. A vertical take-off and landing aircraft according to Claim 1, wherein said magnetic induction drive is powered by electric power provided by lightweight batteries carried on said main body.

18. A vertical take-off and landing aircraft according to Claim 1, wherein said magnetic induction drive is powered by electric power provided by lightweight fuel cells carried on said main body.

19. An air impeller engine oriented substantially along an impeller axis having an impeller rotor mounted within an air channel duct or shroud, said impeller rotor being formed with impeller blades with inner ends fixed to a central hub and outer ends fixed to an annular impeller disk rotatable about the impeller axis to propel a thrust flow of air, a magnetic bearing system for suspending the impeller rotor substantially friction-free within the air channel duct or shroud, and a magnetic induction drive formed by one array of magnetic induction elements arranged circumferentially on the annular impeller disk of said impeller rotor and another array of magnetic induction elements arranged on a wall of said air channel duct or shroud facing opposite the array on the annular impeller disk across a small air gap therebetween for driving the impeller disk in rotation by magnetic induction.

20. An air impeller engine according to Claim 19, further comprising an air directing assembly for directing at least a part of the thrust flow of air from the air impeller engine in a desired angular direction with respect to the impeller axis.